

Unit 4.5
Counting Principles
Day 5

You are picking 7 sodas from a cooler that has 5 Cokes and 6 Diet Cokes.

a) How many combinations of 7 sodas can you choose?

$$C(11, 7) = 330 \text{ combinations}$$

b) How many combinations of sodas include 3 cokes and 4 Diet Cokes?

$$C(5, 3) \cdot C(6, 4) = 10 \cdot 15 = 150 \text{ combos}$$

c) How many combinations of 7 sodas include 2 Cokes?

$$\begin{array}{c} \text{Coke} \\ C(5, 2) \\ 10 \end{array} \cdot \begin{array}{c} \text{DC} \\ C(6, 5) \\ 6 \end{array} = 60 \text{ combinations}$$

d) How many combinations include at least 4 Diet cokes?

Pick 1
ONLY
OR
AND

$$4 \text{ DC} + 3 \text{ C} \text{ OR } 5 \text{ DC} + 2 \text{ C} \text{ OR } 6 \text{ DC} + 1 \text{ C} \text{ OR } 7 \text{ DC}$$

$$C(6, 4) \cdot C(5, 3) + C(6, 5) \cdot C(5, 2) + C(6, 6) \cdot C(5, 1)$$

15 10 1 10 1 5

$$\begin{array}{r}
 15 \cdot 10 \\
 150
 \end{array}
 +
 \begin{array}{r}
 6 \cdot 10 \\
 60
 \end{array}
 +
 \begin{array}{r}
 1 \cdot 5 \\
 5
 \end{array}
 = 215 \text{ combinat}$$

If time do some of the homework together . . .

Homework
Day 5

4/6

$$a) C(5,3) = {}_5C_3 = \binom{5}{3}$$

$$C(5,3) = 10$$

$$= \frac{5!}{(5-3)!3!}$$

$$10 = \frac{5 \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}{\cancel{2} \cdot \cancel{1} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}$$

$$\begin{array}{rclcl}
 \text{b)} & 1 \text{ R} & \text{AND} & 2 \text{ Good} & \\
 & C(5,1) & \cdot & C(20,2) & \\
 & 5 & \cdot & 190 & = 950 \\
 & & & & \text{ways}
 \end{array}$$

65

$$\binom{n}{n-r} = \binom{n}{r}$$

$$\binom{n}{n-r} = \frac{n!}{(n-r)!r!}$$

$$= \frac{n!}{(n-r)!r!}$$

$$= \frac{n!}{(n-r)!r!}$$

$$= \binom{n}{r}$$

$$= \binom{n}{r}$$

64

$$\binom{n}{n-1} = n$$

$$\binom{n}{n-1} = n \binom{n-1}{n-1}$$

$$= \frac{n!}{[n-(n-1)]!(n-1)!}$$

$$= \frac{n!}{1!(n-1)!}$$

$$\rightarrow = \frac{n \cdot \cancel{(n-1)!}}{1 \cdot \cancel{(n-1)!}}$$

$$= n$$

$$\frac{5!}{5 \cdot 4!}$$